

REQUIRED TOPIC 4: BLOOD GLUCOSE MONITORING**STATEMENT OF THE PROBLEM**

Keeping track of blood sugar (glucose), knowing their range should be and knowing what to do when your blood sugars fall outside the normal range is one more key to managing diabetes and preventing complications.

KEY MESSAGES

1. Checking your blood sugar is the best way to know on a day-to-day basis how well you are managing your diabetes
2. How often you monitor depends on how much information you need to make decisions on treating your diabetes. Work with your doctor to find a plan that is manageable
3. A Hemoglobin A1c is a blood test that can assess your blood sugar for the past 2-3 months. It is not a substitute for regular monitoring at home.
4. Recording your blood sugar readings allows you to identify trends

BACKGROUND

Why should people with diabetes monitor their blood sugar at home?

Blood glucose (sugar) readings provide important information for people with diabetes. Monitoring blood sugar allows people with diabetes to track and make decisions about how they are responding to their treatment plan (medications, food they eat and activity they engage in). In addition to being able to assess one's treatment plan, it's critical to know if their blood sugar is at a dangerous level. For example, if blood sugar levels drop too low, it can result in loss of consciousness and even death. High blood sugar readings that continue over time, may lead to severe complications. The only sure way to find out your blood sugar level is to test it.

Blood glucose monitoring includes keeping a record/log of the daily blood glucose readings from the blood glucose monitor. Sharing this record with health care providers helps fine-tune the care people with diabetes receive. Blood glucose monitors have a memory that stores glucose readings for weeks or months, but it is very helpful for people to write record/log the values in a record book or worksheet along with the date and time, association to a meal and any other pertinent information (i.e. walked extra this day or ate less than usual at lunch, etc.). Comparing daily readings over a span of several weeks allows one to identify trends (i.e. blood glucose readings are always higher in the morning).

Bring your meter and your blood glucose log to your diabetes appointments with your provider or other diabetes health care appointments and spend time discussing your readings and what they mean. Many health care clinics have the ability to download (via computers) the information captured on blood glucose meters.

EXAMPLE BLOOD SUGAR LOG

Date	Breakfast		Lunch		Dinner		Bedtime		Other		Comments
	Time	Blood Glucose	Time	Blood Glucose	Time	Blood Glucose	Time	Blood Glucose	Time	Blood Glucose	
1/30	7:00	205	12:00	158	5:00	198	10:30	215	3:30p	250	Felt tired & some blurred vision, mid afternoon
1/31	7:30	220	11:30	178	5:30	190	11:30	175			Tried to eat smaller portions at dinner
2/01	7:00	172	11:30	142	5:30	185	11:00	170			Felt better today!

HOW OFTEN SHOULD PEOPLE TEST THEIR BLOOD SUGAR?

Even a person who works hard to control his/her blood glucose can see quite a bit of variation in glucose readings. This is especially true with a varied diet or meal schedule. It is helpful to have multiple tests to be able to identify trends.

How often a person should test their blood sugar depends on:

- The type of diabetes they have
- What medications are taken and how often
- How close the blood glucose values are to the desired levels

There are no absolute recommendations/guidelines to monitoring, however clients and their health care provider/team often work out a schedule that is reasonable (one that is doable for the client and provides enough information to evaluate their treatment plan). The following are common plans for people with diabetes:

A person with type 2 diabetes that is on an oral medication that may cause hypoglycemia may be able to test just once or twice a day. They may test once at fasting (before breakfast) and again at a later time during the day. It's useful to vary the time of the second reading, to provide more information over time. For example, you could test on Monday afternoon at 2pm and Thursday at 5pm.

A person with type 2 diabetes who is taking a medication such as metformin that does not cause hypoglycemia may not need to test a fasting blood sugar every day. Instead, they may test their blood sugar at alternate times on alternate days to see if you can see a pattern or talk to your provider about what will be most helpful. (See handout for example)

When newly diagnosed with diabetes, it's a good idea to check more often. Many people check 4 times a day at first. It may be helpful to check more often when starting a new treatment plan (a change in medication or adjustment in diet or exercise) to see how the change affects the blood sugar readings.

A person who takes insulin will more than likely need to check their blood glucose often. They may need to check each time prior to taking insulin, in the morning, before meals, and in the evening. Taking insulin without knowing one's blood glucose level can lead to improper dosing and hypoglycemia. If you are using insulin one or more times a day, you should talk to your provider about when and how often to test is best for you.

It's important to know that people with diabetes should also check their blood sugar whenever they feel "off" or "funny," especially if they feel:

- More tired than usual
- Sick/ill
- Stressed
- Symptoms of high or low blood sugar (review signs and symptoms in Topic 3)

The only way to verify that the feelings or symptoms are indeed due to diabetes is by checking the blood sugar.

THE REALITY OF BLOOD GLUCOSE MONITORING:

Many people find monitoring a difficult task to do. It's often uncomfortable (the pokes hurt), time-consuming (even though many readings now take less than 1 minute, locating equipment and stopping their activities is often viewed as disruptive) and can draw unwanted attention, especially when in public. Talk to your provider about your concerns, difficulties, and fears around glucose monitoring and negotiate how often and when to check your blood glucose.

[It is also often helpful to point out that the blood sugar readings (frustrating as they may be) are a way for a person with diabetes to take control of his/her disease.]

COSTS OF BLOOD GLUCOSE MONITORING

A significant barrier to regular blood glucose monitoring for many people is the cost of the strips. Most often, a monitor can be obtained for free or for a very low cost. Lancets (used to get a drop of blood) are also inexpensive. But the strips for each monitor can be up to \$1.00 each. People with insurance can get a specified number of strips paid for with a prescription, but those without insurance will pay for strips themselves. For many people this may be a difficult choice to make—to spend money on strips or on medications, food, or other necessities.

Not checking blood glucose when taking hypoglycemic medications (such as Insulin, Glipizide, or Prandin), when ill, or when changing eating or exercise patterns or routines can lead to an unsafe situation if blood glucose gets too high or too low. While many people believe they can "feel" a low or high blood sugar, over time, and

especially when blood glucose is higher than the target range, most people become insensitive to the symptoms of low blood glucose. Or they may confuse a low blood glucose with a high.

Always let your health care provider know if you are not monitoring blood glucose as s/he recommended. They can help you make a plan that will use fewer strips and lower the cost, yet still help you understand your levels and keep you safe.

WHAT IS THE NORMAL BLOOD SUGAR RANGE?

Target ranges can vary slightly between different organizations. Clients should work with their provider and health care team to determine what their individual target range should be.

	Normal (without diabetes)	Target for Person with Diabetes (American Diabetes Association 2013)
Fasting*	<100 mg/dl ("Pre-diabetes" or at risk for diabetes: 100-125)	80-120
Before Meals	<100	70-130
After Meals	<140	<180

*Fasting blood sugar is usually measured in the morning, before breakfast/food for the day.

Keeping blood sugar in the normal to near normal range may help prevent or delay the onset of complications associated with diabetes. People with diabetes often feel better if their blood sugar is consistent and in the near normal range.

It is important to note that there may be good reasons to keep blood sugar a little higher than the target ranges. People with "tighter control" (blood sugar levels closer to normal) may run the risk of more hypoglycemic (low blood sugar) reactions. This may be particularly problematic in the elderly or disabled. It's best for clients to work with their provider to determine individual goals.

TIPS ON EQUIPMENT (METERS AND LANCETS/PUNCTURE DEVICES):

Meters come with instruction manuals that often provide 1-800 numbers for questions and troubleshooting

Most pharmacists can provide teaching on how to monitor (patients should be encouraged to follow up with their pharmacy and/or clinic RNs or a diabetes educator for additional teaching needs).

Strips can become inaccurate if left exposed to air for two hours or greater. Instruct clients to cap their vials immediately after taking out the strip.

Sharps (lancets and needles) need to be disposed of safely. Sharp containers are often available through pharmacies. Please note the city and county recommendations on disposal of sharps (City of Seattle has different guidelines than King County).

HEMOGLOBIN A1C

A hemoglobin A1c (or simply A1c) is a type of blood test that is performed every 3-4 months, or at least twice a year. Hemoglobin is a protein in the red blood cell that carries oxygen in the body. When glucose enters the red blood cells, it links up with hemoglobin. We can measure this amount and obtain an estimate of your “average” blood glucose over the past 2-3 months.

Most people should keep their A1c at or below 7%, which is less than about 140 mg/dl on average; although a higher target may apply to those clients with more medical problems or who are older.

While an A1c provides good information over the long term, it does not replace regular monitoring at home. Because it is an “average” it cannot tell you about the highs and lows that can occur daily or weekly. In addition, you can't adjust your insulin on the basis of your A1C tests. That's why your blood sugar checks and your log of results are so important to staying in effective control.

PATIENT OUTCOMES/GOALS

By the end of the educational session, the client with diabetes will be able to:

- State their personal monitoring schedules.
- State one example time when blood sugar absolutely should be checked.
- State their personal goal blood sugar ranges and their A1c goal.
- State what they need to talk to their health care provider about for a monitoring schedule that works for them.

CHW ACTIONS	PARTICIPANT ACTIONS
<ul style="list-style-type: none"> • Explore the participant's concerns about blood glucose monitoring. • Ask about the participant's schedule for testing blood glucose and the blood glucose range the health care provider has set. • Ask what the participant would do if the blood glucose readings are not in the target range. • Establish a goal and an action plan around blood glucose testing e.g. gather all monitoring materials in one box, bag; test and record blood sugar before breakfast (or lunch, dinner...) review blood glucose records and note patterns • Demonstrate how to use a blood glucose monitor if necessary • Ask client when was the last time they had an A1c test. • Important Note: It is recommended to avoid specific blood sugar goals/targets as these should be determined by the provider and client and they are affected by too many variables (can be frustrating for short term goals). 	<ul style="list-style-type: none"> • Problem-solve any barriers to blood glucose testing. • Establish a goal and schedule for testing and keep a record of blood glucose readings. • Determine if readings are within the target range. If not, determine what may be causing the variation e.g. diet, exercise, medication, illness, stress. • Identify what to do and when to contact the health care provider if blood glucose values are out of range. • Schedule an appointment for an A1c test with the client's health care provider.

TOOLS/TEACHING AIDES

AIDES:

- None

HANDOUTS

1. **Topic 4 Coversheet**.....[English](#) | [Spanish](#)
2. **Checking Your Blood Sugar**.....[English](#) | [Spanish](#)
Source: [Public Health – Seattle & King County](#)
3. **Take Care of Yourself on Sick Days**.....[English](#) | [Spanish](#)
Source: [Public Health – Seattle & King County](#)

4. **Blood Glucose Monitoring Log**[English](#) | [Spanish](#)
Source: [Public Health – Seattle & King County](#)
5. **What’s Your A1c?**[English](#) | [Spanish](#)
Source: [Learning About Diabetes](#), Inc. 2006
6. **Alternate Times/Alternate Days pattern sample**
.....[English-Blank](#) | [English-Sample](#)
.....[Spanish-Blank](#) | [Spanish-Sample](#)
Source: [Public Health – Seattle & King County](#)
7. **Action Plan**.....[English](#) | [Spanish](#)
Source: [Public Health – Seattle & King County](#)

REFERENCES

American Diabetes Association. <http://www.diabetes.org/type-2-diabetes/blood-glucose-checks.jsp>

American Diabetes Association Complete Guide to Diabetes, 4th Edition. Writer, Nancy Touchette, PhD.
American Diabetes Association, 2005.

Type 2 Diabetes. A Curriculum for Patients and Health Professionals. Michigan Diabetes Research and Training Center. Funnell, M., Arnold M., Lasichak, A. & Barr, P. American Diabetes Association, 2002

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